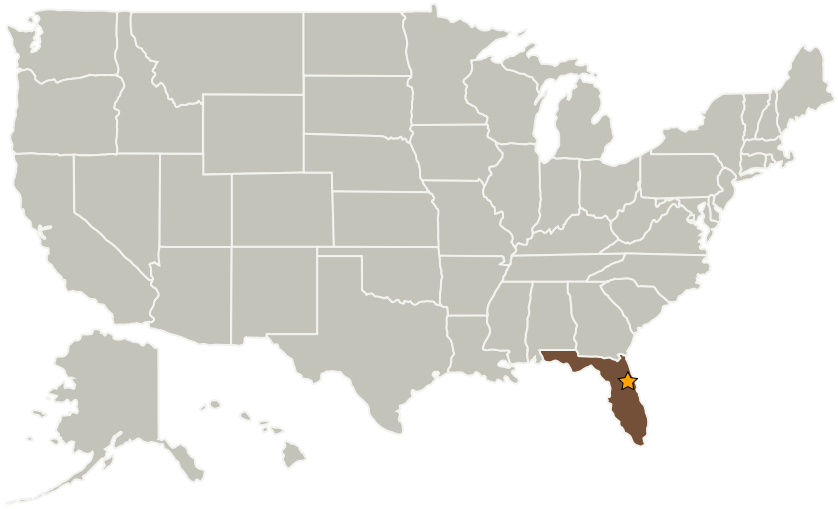
Nanotube Adsorption for the Capture and Re-liquefaction of Hydrogen Biol-Off During Tanker Transfer Operations, Phase I

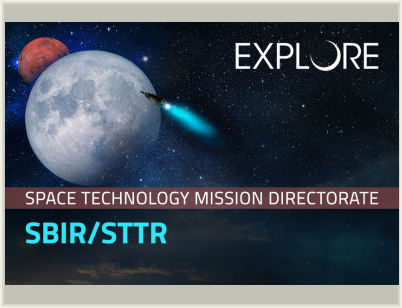
Completed Technology Project (2006 - 2006)

Project Introduction

This proposal discloses an innovative, economically feasible technique to capture and re-liquefy the hydrogen boil-off by using carbon nanotube adsorption prior to liquefaction. The hydrogen boil- off involves an average of 10,300 SCFM of hydrogen vapor at pressures below 17 psia for a period of an hour. The configuration disclosed in the proposal significantly reduces the size of the liquefaction equipment and this translates into a substantial reduction in cost for the system. Preliminary calculations have indicated that a payback period of less than 12 months (based on the current cost of hydrogen and the use rate at KSC when shuttles return to flight). The Phase I effort will also experimentally demonstrate the performance of a carbon nanotube coated (CNC) adsorption bed in Phase I. This proposal discloses a patent-pending approach which makes this technology feasible, safe and affordable. The Phase I effort is significant, in that an extensive demonstration of the performance, cost, durability, and simplicity of the CNC adsorption bed as well as a demonstration of the economic benefits of the hydrogen capture system for NASA/KSC will both be achieved before proceeding to Phase II.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Mainstream Engineering Corporation	Supporting Organization	Industry	Rockledge, Florida

Primary U.S. Work Locations
Florida

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors